UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,376	09/30/2003	John A. Hughes	240720US6YA	4362

22850 7590 08/11/2009

OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
GRAMAGLIA, MAUREEN	
ART UNIT	**PAPER NUMBER**
1792	

NOTIFICATION DATE	DELIVERY MODE
08/11/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary	Application No.	Applicant(s)	
	10/673,376	HUGHES ET AL.	
	Examiner	Art Unit	
	Maureen Gramaglia	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26 and 40-45* is/are pending in the application.

4a) Of the above claim(s) *2,4-10,12-17,19,21 and 23-26* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,11,18,20,22 and 40-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. **Claim 18 is objected to because of the following informalities:** There is no period at the end of Claim 18. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 11, 18, 20, 22, and 40-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,556,500 to Hasegawa et al. in view of U.S. Patent 7,227,097 to Kumar et al.

In regards to Claims 1, 18, 40, and 42, Hasegawa et al. teaches a semiconductor manufacturing system for processing a substrate using a plasma process, comprising: a plasma processing chamber 12 configured to facilitate said plasma process; a substrate holder 14 coupled to the processing chamber and configured to support a substrate S to be processed by attracting and holding the substrate is provided; a gas distribution system 34 configured to introduce a process gas to said processing chamber; a plasma source (RF power source 46) coupled to said processing chamber and configured to generate a plasma in the processing chamber; and a processing element coupled to the processing chamber and the substrate holder; said processing element comprising a first substantially cylindrical ring shaped element 104 formed of a passive component

and a second substantially cylindrical ring shaped element 106 formed of an active component configured to alter the chemistry of the processing when exposed to a plasma, said first and second elements 104 and 106 together forming a cylindrical ring shaped element 102; each of elements 104 and 106, and the cylindrical ring shaped element 102 formed by the elements 104 and 106 together configured to erode when exposed to a plasma process (see at least Column 9, Lines 36-47); each of said cylindrical elements 104, 106, and joint cylindrical element 102 having a first radially extending surface and a second radially extending surface opposite the first radially extending surface, wherein an inside diameter of each cylindrical unit (104, 106, or 102) forms an opening for disposition of the cylindrical unit around a substrate position in the semiconductor manufacturing system and the second radially extending surface is a substantially planar surface for disposition on a substrate holder in the semiconductor manufacturing system. (See at least Figure 1; Column 1, Lines 6-8; Column 3, Line 54 - Column 4, Line 3; Column 4, Lines 21-45; Column 6, Line 5 - Column 7, Line 8; Column 9, Lines 36-47)

Hasegawa et al. teaches an alternative embodiment (Figure 8) of a semiconductor manufacturing system for processing a substrate using a plasma process, comprising: a plasma processing chamber 204 configured to facilitate said plasma process; a substrate holder 208 coupled to the processing chamber and configured to support a substrate S to be processed by attracting and holding the substrate is provided; a gas distribution system 205 configured to introduce a process gas to said processing chamber; a plasma source (magnet 207; RF power source 224)

coupled to said processing chamber and configured to generate a plasma in the processing chamber; and a processing element coupled to the processing chamber and the substrate holder; said processing element comprising a cylindrical ring shaped element 208d comprising a passive component and configured to erode when exposed to a plasma process (see at least Column 9, Lines 36-47, which explains that a ring will erode when exposed to the plasma; and Column 10, Line 65 - Column 11, Line 2); said cylindrical element 208d having a first radially extending surface and a second radially extending surface opposite the first radially extending surface, wherein an inside diameter of the cylindrical unit 208d forms an opening for disposition of the cylindrical unit around a substrate position in the semiconductor manufacturing system and the second radially extending surface is a substantially planar surface for disposition on a substrate holder in the semiconductor manufacturing system. (See at least Figure 8; Column 1, Lines 6-8; Column 9, Lines 36-47; Column 10, Line 15 - Column 11, Line 52)

In regards to Claims 1, 18, 40, and 42, Hasegawa et al. does not expressly teach in either of the embodiment of Figure 1 or the embodiment of Figure 8 that a cylindrical element configured to erode when exposed to the plasma can comprise a cylindrical passive polymeric component *and* an active component, wherein the passive polymeric component is configured to erode when exposed to the plasma and *the active component is included as a part of the passive component* and configured to alter the chemistry of the processing when exposed to the plasma. In regards to Claims 3, 11, 20, and 22, Hasegawa et al. further does not teach wherein the active component comprises a distribution of solid particles encapsulated within the passive component.

Kumar et al. teaches a processing element for a plasma processing system (Column 3, Lines 18-20), comprising: a passive polymeric component (*a passive plasma catalyst…capable of inducing a plasma by deforming a local electric field*, Column 9, Lines 2-11, which can be *an electrically conductive polymer* or *a polymer nanocomposite*, Column 10, Lines 3-8) that can have various shapes including that of a cylindrical ring (*annular*; Column 10, Lines 50-53) and is configured to erode when exposed to a plasma process in the plasma processing system (it is *consumed by the plasma*; ex. Column 11, Lines 37-43); and an active component included as a part of said passive component and configured to alter the chemistry of the processing when exposed to the plasma process (*an additive [that] can include any material that a user wishes to add to the plasma*, such as *a dopant* or *a precursor material that, upon decomposition, can form the dopant*; Column 11, Lines 1-17). Kumar et al. teaches that the active component can comprise a distribution of solid particles (*the additive*) encapsulated within the passive component *(the passive plasma catalyst*). (Column 11, Lines 1-54; Figure 3)

In regards to Claims 1, 3, 11, 18, 20, 22, 40, and 42, it would have been obvious to one of ordinary skill in the art to modify the embodiment of either Figure 1 or Figure 8 of Hasegawa et al. to substitute a cylindrical ring-shaped element comprising a passive polymeric component, and an active component comprising a distribution of solid particles encapsulated within the passive component, the active component configured to alter the chemistry of the processing when exposed to the plasma process, as taught by Kumar et al., for any of the cylindrical ring-shaped elements 104 and/or 106 of Figure

1, or the entire cylindrical ring-shaped element 102 formed by elements 104 and 106, and/or the cylindrical ring-shaped element 208d of Figure 8 of Hasegawa et al. The motivation for making such a modification, as taught by Kumar et al. (see at least Column 11, Lines 1-54), would have been to allow for the delivery of any desirable additive that a user wishes to add to the plasma, including a plasma catalyst or dopant.

In regards to Claims 41 and 43, Hasegawa et al. teaches that the cylindrical ring-shaped element 102 placed around the substrate position can have a stepped portion at a radially inner part of the cylindrical ring-shaped element 102 (Figure 1). The stepped portion is considered to be exposed to the plasma process, since plasma may enter the gap between the edge of the substrate and the stepped portion. Hasegawa et al. therefore teaches wherein the surface of the cylindrical ring-shaped element can comprise a surface exposed to the plasma process prior to surface exposure to the plasma process having a greater area (due to the additional surface area of vertical step) than an opposite surface of the cylindrical ring-shaped element that is *in contact* with a substrate holder surface. (Figure 1)

It would have been obvious to one of ordinary skill in the art, in the combination of Hasegawa et al. and Kumar et al., to form the passive polymeric ring-shaped component to have a stepped portion at a radially inner part of the cylindrical ring-shaped element, such that the surface of the cylindrical ring-shaped element can comprise a surface exposed to the plasma process prior to surface exposure to the plasma process having a greater area (due to the additional surface area of vertical step) than an opposite surface of the cylindrical ring-shaped element that is *in contact*

with a substrate holder surface, as suggested by the teachings of Hasegawa et al. The motivation for making such a modification, as taught by Hasegawa et al. (Column 6, Lines 46-64), would have been to prevent a local charge-up phenomenon at the peripheral portion of the substrate.

4. Claims 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. in view of Kumar et al. as applied to claims 1 and 18 above, and further in view of U.S. Patent 5,474,649 to Kava et al.

The teachings of Hasegawa et al. and Kumar et al. were discussed above.

In regards to Claims 44 and 45, the combination of Hasegawa et al. and Kumar et al. as discussed above does not expressly teach wherein the passive polymeric component comprises an insulating material.

Kumar et al. further teaches that the passive component can further comprise an insulating material (*a substantially non-electrically conductive coating*; Column 12, Lines 10-28)

Kava et al. teaches that an electrically insulating polymeric material is a suitable material for forming a focus ring in a plasma chamber. (Column 4, Line 58 - Column 5, Line 34)

It would have been obvious to one of ordinary skill in the art to modify the passive polymeric ring-shaped component of Hasegawa et al. and Kumar et al. to comprise at least a coating of an electrically insulating polymeric material, as an electrically insulating coating is taught by Kumar et al. to be an art-recognized suitable material for forming a passive component in a plasma chamber and Kava et al. teaches an

electrically insulating polymeric material to be an art-recognized suitable electrically insulating material for use in a ring-shaped component in a plasma chamber. It has been held that the selection of a known material based on its suitability for its intended use is prima facie obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Response to Arguments

5. Applicant's remaining arguments filed 1 May 2009 have been fully considered but they are not persuasive.

In regards to Applicant's arguments against the teachings of Hasegawa, these arguments are not persuasive. Specifically in regards to Applicant's argument that Hasegawa teaches away from providing a single focus ring, this argument is not persuasive. Examiner recognizes that Hasegawa teaches certain advantages in providing separate focus rings, as described in the passage cited by Applicant. However, Hasegawa additionally teaches embodiments comprising only a single focus ring, for example the embodiment of Figure 8. Thus Hasegawa cannot be considered to teach away from providing only a single focus ring around the substrate.

In regards to Applicant's argument that Hasegawa et al. teaches that it is necessary that the focus ring have "anti-corrosion properties (anti-chemical properties with high resistance to etching gas)…[and] heat resistance", and that therefore Hasegawa et al. teaches away from an erodible polymeric component, this argument is not persuasive. The teachings of Hasegawa et al. upon which Applicant relies as teaching away from the claimed invention are part of the *background* of Hasegawa et

al., i.e. the prior art upon which Hasegawa et al. seeks to improve. Contrary to Applicant's assertion that the inventive focus ring structures of Hasegawa et al. must be formed of a material having a high resistance to etching gas, and are therefore contrary to the instantly claimed invention, Hasegawa et al. teaches a focus ring that erodes when exposed to plasma (see at least Column 9, Lines 36-47, which explains that a ring will erode when exposed to the plasma; and Column 10, Line 65 - Column 11, Line 2).

Additionally, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In the instant case, while Hasegawa alone does not teach that the erodible component is a polymeric component, Examiner maintains that one of ordinary skill in the art*, taking the combined teachings of Hasegawa and Kumar into consideration*, would have found it obvious, with a reasonable expectation of success in obtaining the predictable and desirable result of releasing the active component of Kumar by erosion of the passive component of Kumar, to replace one *or* both of the focus rings 104, 106 of Figure 1 taught by Hasegawa *or* the focus ring 208d of Figure 8 taught by Hasegawa with the ring comprising an active material embedded in a passive material as taught by Kumar.

In regards to Applicant's argument that Hasegawa et al. teaches away from having a focus ring that would readily erode, because it would readily consume the

reactive species that would otherwise etch the intended portion of the wafer, this argument is not persuasive. That Hasegawa et al. teaches a particular way of processing a wafer using a plasma, even what Hasegawa et al. considers to be the best way of processing the wafer, does not mean that Hasegawa et al. teaches *away* from any other plasma profile. Furthermore, the degree to which the erodible polymeric component taught by the combination of Hasegawa et al. and Kumaret al. would erode in the plasma, thereby consuming reactive species, would be dependent on a number of process variables, especially the type of process gas supplied to the chamber and the type of substrate to be processed, which are matters of intended use of the apparatus of Hasegawa et al. and Kumar et al. The apparatus of the combination of Hasegawa et al. and Kumar et al. would still be structurally capable of executing uniform processing of the substrate, based up on user selection of the process variables. Moreover, the erodible polymeric component of the combination of Hasegawa et al. and Kumar et al. releases the active component into the plasma, which would be expected by one of ordinary skill in the art to provide a benefit of adding a desired chemical to the plasma, a benefit which would be expected to offset any corresponding loss in the active species used to etch the passive polymer to release the active component.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., that the combination of Hasegawa et al. and Kumar et al. does not teach that the focus ring is formed *only* of an electrically insulating material) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification,

limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). As discussed above, it would have been obvious to one of ordinary skill in the art to modify the passive polymeric ring-shaped component of Hasegawa et al. and Kumar et al. to comprise at least a coating of an electrically insulating polymeric material, as an electrically insulating coating is taught by Kumar et al. to be an art-recognized suitable material for forming a passive component in a plasma chamber and the newly cited reference to Kava et al. teaches an electrically insulating polymeric material to be an art-recognized suitable electrically insulating material for use in a ring-shaped component in a plasma chamber.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

6. Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen Gramaglia whose telephone number is (571)272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Maureen Gramaglia/
Examiner, Art Unit 1792

/Parviz Hassanzadeh/
Supervisory Patent Examiner, Art Unit 1792